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WOOD, HERRON & EVANS, LLP
2700 CAREW TOWER
441 VINE STREET
CINCINNATI, OH 45202

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THOMPSON, JAMES A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,932	RUSSELL, GARY	
	Examiner	Art Unit	
	James A. Thompson	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2005 and 09 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-28,30,31,33-37 and 39-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Examiner notes that the cancellation of claim 6 and the amendments to claims 26, 42 and 44 overcome the objections to claims 6, 26, 42 and 44, listed in items 1-3 of the previous office action, dated 05 April 2005. The objections to claims 6, 26, 42 and 44 are therefore withdrawn.

2. Examiner notes that the amendments to claims 59 and 72 overcome the rejections under 35 USC §112, 2nd paragraph listed in items 4-6 of said previous office action. Therefore, the rejections of claims 59 and 72 under 35 USC §112, 2nd paragraph have been withdrawn.

3. Applicant's arguments filed 17 October 2005 have been fully considered but they are not persuasive.

Firstly, Examiner notes that independent claims 8, 26, 46, 47, 60, 68 and 75 have not been amended to include language corresponding to the limitation that the overlapping dots are of the same (not multiple) halftone screen. Thus, the original prior art rejections still apply. Furthermore, the limitation regarding "line frequency" as opposed to the originally recited "frequency" overcomes the prior art rejections that were based in part upon Curry (US Patent 5,696,604). However, for claims in which "frequency" has been amended to recite "line frequency" and which were rejected in part based upon Tai (US Patent 5,729,632), the amendment has not overcome the prior art rejection since "line frequency" is clearly taught as recited in the context of the claims.

Secondly, with respect to the claims Applicant has amended such that the prior art rejections have been overcome, additional art has been discovered which either anticipates the claims or renders the claims obvious.

Thirdly, all new grounds of rejection presented below have been necessitated by the present amendments to the claims.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 27-28 and 65 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang (US Patent 5,748,330).

Regarding claim 1: Wang discloses overlapping at least a portion of a first dot of a halftone cell of a halftone screen with at least a portion of a second dot of said halftone cell of said halftone screen (figures 3A-3D; column 6, lines 6-9 and lines 21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang).

Regarding claim 27: Wang discloses a program (column 7, lines 19-27 of Wang) configured to place a first and a second dot within a halftone cell of a halftone screen, wherein at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D; column 6, lines 6-9 and lines 21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang); and a signal bearing medium bearing said program (column 7, lines 19-27 of Wang).

Regarding claim 28: Wang discloses that said signal bearing medium includes a at least one of a recordable medium and a transmission-type medium (column 7, lines 24-27 of Wang). In order for software to be usable by a system, software must be embodied on some form of recordable medium. Otherwise, it is not possible for the system to read and execute the instructions in said software. Further, software must be transmittable from some type of physical storage drive to the CPU and RAM of the computer or workstation. Therefore, said signal bearing medium must inherently comprise some form of transmission type medium.

Regarding claim 65: Wang discloses that producing said halftone image further includes producing at least one of a printing plate, a threshold array, and a halftone screen (figures 3A-3D and column 6, lines 6-9 of Wang).

6. Claims 8, 12 and 46-47 are rejected under 35 U.S.C. 102(b) as being anticipated by Harrington (US Patent 5,631,748).

Regarding claim 8: Harrington discloses placing a first and a second dot within a halftone cell, wherein said first and second halftone dots are dissimilar (figure 4B and column 5, lines 46-49 of Harrington). An example of two dots within the halftone cell shown in figure 4B of Harrington are the cyan and yellow dot shown in figure 4B("CY") of Harrington. Since one dot is cyan and the other dot is yellow, then said first and second halftone dots are clearly dissimilar.

Regarding claim 12: Harrington teaches differing tonal characteristics of said first and second dots (figure 4B ("CY") of Harrington). As is well-known in the art, cyan dots and magenta dots have different tonal characteristics since yellow

dots are generally lighter for the same intensity value than cyan dots.

Regarding claim 46: Harrington discloses a printing system (figure 1 of Harrington) comprising a scanning circuit (figure 1 (10) of Harrington) for reading image data from a source (column 4, lines 21-24 of Harrington); a processor in communication with said scanning circuit (figure 1(20) of Harrington), wherein said processor receives and processes the image data to generate an image file (column 4, lines 33-38 of Harrington); and an image setter in communication with said processor (figure 1(30) of Harrington), wherein said image setter receives said image file from said processor and produces a plurality of dots on a recording medium (column 4, lines 40-46 of Harrington), said plurality of dots including a first and a second dot within a halftone cell of said recording medium, wherein at least a portion of said first dot overlaps at least a portion of said second dot (figure 4B("CY" and "MC") and column 5, lines 46-49 of Harrington). The resultant colorant values must be stored in some form of an image file since the colorant values are then halftoned at the halftoning processor and used to drive the printer (column 4, lines 38-40 of Harrington). Further, as can clearly be seen in figure 4B of Harrington, two locations in the halftone cell have overlapping dots (figure 4B("CY" and "MC") and column 5, lines 38-46 of Harrington), one location overlapping a cyan and a yellow dot (figure 4B("CY") of Harrington) and one location overlapping a magenta and a cyan dot (figure 4B("MC") of Harrington).

Regarding claim 47: Harrington discloses a printing system (figure 1 of Harrington) comprising a scanning circuit (figure 1 (10) of Harrington) for reading image data from a source (column

4, lines 21-24 of Harrington); a processor in communication with said scanning circuit (figure 1(20) of Harrington), wherein said processor receives and processes the image data to generate an image file (column 4, lines 33-38 of Harrington); and an image setter in communication with said processor (figure 1(30) of Harrington), wherein said image setter receives said image file from said processor and produces a plurality of dots on a recording medium (column 4, lines 40-46 of Harrington), said plurality of dots including a first and a second dot within a halftone cell of said recording medium, wherein said first and second dots are dissimilar (figure 4B and column 5, lines 46-49 of Harrington). The resultant colorant values must be stored in some form of an image file since the colorant values are then halftoned at the halftoning processor and used to drive the printer (column 4, lines 38-40 of Harrington). Further, an example of two dots within the halftone cell shown in figure 4B of Harrington are the cyan and yellow dot shown in figure 4B ("CY") of Harrington. Since one dot is cyan and the other dot is yellow, then said first and second halftone dots are clearly dissimilar.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2, 5 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Tai (US Patent 5,729,632).

Regarding claim 2: Wang does not disclose expressly differing line frequencies of said first and second dots.

Tai discloses differing line frequencies of said first and second dots (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Wang and Tai are combinable because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of differing line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang to obtain the invention as specified in claim 2.

Regarding claim 5: Wang does not disclose expressly differing tonal characteristics of said first and second dots.

Tai discloses differing tonal characteristics of various dots (figure 2 and column 3, lines 37-43 of Tai).

Wang and Tai are combinable because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to differ the tonal characteristics of the dots, as taught by Tai. The motivation for doing so would have been that using different types of

grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang to obtain the invention as specified in claim 5.

Regarding claim 42: Wang does not disclose expressly creating said halftone image to include dots having different line frequencies.

Tai discloses that dots being used to create a halftone image have different line frequencies (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Wang and Tai are combinable because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would use dots having different line frequencies to create a halftone image, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang to obtain the invention as specified in claim 42.

9. Claims 7, 14, 19 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463).

Regarding claim 7: Wang does not disclose expressly orienting a first angle of said first dot differently than a

second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15-20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Wang and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Wang at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Wang to obtain the invention as specified in claim 7.

Regarding claim 14: Wang discloses a first and a second dot within a halftone cell of a halftone screen, wherein at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D; column 6, lines 6-9 and lines 21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang).

Wang does not disclose expressly that said halftone screen is specifically formed by a printing plate.

Delabastita discloses using a printing plate to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita).

Wang and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Wang on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Wang to obtain the invention as specified in claim 14.

Regarding claim 19: Wang does not disclose expressly that said first dot is oriented at a different angle than said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first dot at a different angle than a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15-20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Wang and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Wang at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Wang to obtain the invention as specified in claim 19.

Regarding claim 73: Wang discloses at least one of a threshold array and a halftone screen (figures 3A-3D and column 6, lines 6-9 of Wang). Since the printing plate (figures 1a-1f and column 2, lines 15-20 of Delabastita) prints the overall image, then the threshold array and halftone screen are therefore associated with said printing plate.

10. Claims 3 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Curry (US Patent 5,696,604).

Regarding claim 3: Wang does not disclose expressly differing shapes of said first and second dots.

Curry discloses differing dot shapes (column 5, lines 12-17 of Curry).

Wang and Curry are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Wang. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang to obtain the invention as specified in claim 3.

Regarding claim 30: Wang discloses a program (column 7, lines 19-27 of Wang) configured to place a first and a second dot within a halftone cell of a halftone screen, wherein at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D; column 6, lines 6-9 and lines

21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang); and a signal bearing medium bearing said program (column 7, lines 19-27 of Wang).

Wang does not disclose expressly that said first and second dots can further be dissimilar in frequency and shape; and that said dissimilar characteristic is specifically selected.

Curry discloses specifically selecting dot characteristics including dot frequency (figures 5a-5d and column 4, lines 25-29 of Curry) and dot shape (column 5, lines 12-17 of Curry). The dot area corresponds to dot frequency since, for a particular area and shape, a certain frequency is generated for the halftone dot screen.

Wang and Curry are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include dot frequency and dot shape selection, as taught by Curry, as one of the dissimilarities in the group of possible dissimilarities between said first and second dots. Dot properties of said first and second dots, and thus the dissimilarities of said first and second dots, taught by Wang would be specifically selected, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang to obtain the invention as specified in claim 30.

Regarding claim 31: Wang discloses that said signal bearing medium includes a at least one of a recordable medium and a transmission-type medium (column 7, lines 24-27 of Wang).

In order for software to be usable by a system, software must be embodied on some form of recordable medium. Otherwise, it is not possible for the system to read and execute the instructions in said software. Further, software must be transmittable from some type of physical storage drive to the CPU and RAM of the computer or workstation. Therefore, said signal bearing medium must inherently comprise some form of transmission type medium.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Curry (US Patent 5,696,604) and Broddin (US Patent 5,982,989).

Regarding claim 4: Wang does not disclose expressly selecting said shapes of said first and second dots from a group consisting of: elliptical, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Wang and Curry are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang.

Wang in view of Curry does not disclose expressly that said group also contains elliptical and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Wang in view of Curry is combinable with Broddin because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Wang in view of Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Wang in view of Curry to obtain the invention as specified in claim 4.

12. Claims 9, 43, 45, 48-49, 60-62, 64, 68-69, 71 and 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Tai (US Patent 5,729,632).

Regarding claim 9: Harrington does not disclose expressly differing line frequencies of said first and second dots.

Tai discloses differing line frequencies of said first and second dots (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies

(column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of differing line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 9.

Regarding claim 43: Harrington does not disclose expressly creating an array that includes dots having different frequencies.

Tai discloses creating an array that includes dots having different frequencies (column 9, line 63 to column 10, line 2 of Tai). Screen "1" and screen "2" each have different frequencies (column 8, lines 23-31 of Tai) and thus, in blending, create an array including dots of different frequencies.

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use an array of dots having different frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been

obvious to combine Tai with Harrington to obtain the invention as specified in claim 43.

Regarding claim 45: Harrington discloses a printing system (figure 1 of Harrington) comprising a scanning circuit (figure 1 (10) of Harrington) for reading image data from a source (column 4, lines 21-24 of Harrington); a processor in communication with said scanning circuit (figure 1(20) of Harrington), wherein said processor receives and processes the image data to generate an image file (column 4, lines 33-38 of Harrington); and an image setter in communication with said processor (figure 1(30) of Harrington), wherein said image setter receives said image file from said processor and produces a plurality of dots on a recording medium (column 4, lines 40-46 of Harrington). The resultant colorant values must be stored in some form of an image file since the colorant values are then halftoned at the halftoning processor and used to drive the printer (column 4, lines 38-40 of Harrington).

Harrington does not disclose expressly that said plurality of dots includes a plurality of line frequencies.

Tai discloses printing a plurality of dots including a plurality of line frequencies (column 8, lines 24-34 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a plurality of line frequencies for said plurality of dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would

have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 45.

Regarding claim 48: Harrington discloses a program product comprising a program (column 8, lines 35-38 of Harrington) configured to produce a plurality of dots on a recordable medium (column 4, lines 40-46 of Harrington); and a signal bearing medium bearing said program (column 8, lines 35-38 of Harrington).

Harrington does not disclose expressly that said plurality of dots includes multiple line frequencies.

Tai discloses a plurality of dots including a multiple line frequencies (column 8, lines 24-31 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use multiple line frequencies for said plurality of dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 48.

Regarding claim 49: Harrington discloses that said signal bearing medium includes at least one of a recordable medium and a transmission-type medium (column 8, lines 35-38 of Harrington). In order for software to be usable by a computer or workstation, software must be embodied on some form of recordable medium. Otherwise, it is not possible for the computer or workstation to read and execute the instructions in

said software. Further, software must be transmittable from some type of physical storage drive to the CPU and RAM of the computer or workstation. Therefore, said signal bearing medium must inherently comprise some form of transmission type medium.

Regarding claims 60 and 68: Harrington discloses an apparatus (figure 1 of Harrington) which creates a threshold array (figure 3B and column 5, lines 36-39 of Harrington).

Harrington does not disclose expressly that said threshold array includes a gradual transition between highlights and shadows of said threshold array.

Tai discloses a gradual transition (column 9, lines 16-25 of Tai) between highlights and shadows (column 4, lines 30-40 of Tai). A gradually transitioning dot growth pattern is used in the apparatus of Tai (column 9, lines 16-25 of Tai), which produces a gradual transition between the highlights and shadows (column 4, lines 30-40 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to produce a gradual transition between highlights and shadows, as taught by Tai, in the threshold array taught by Harrington. The motivation for doing so would have been that producing a gradual transition between different image regions will better reproduce images with different regions (column 2, lines 46-51 of Tai) and reduce the overall level of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claims 60 and 68.

Further regarding claim 61: Tai discloses that said program is further configured to gradually transition (figure 8 and column 9, lines 63-65 of Tai) between said multiple line frequencies (column 8, lines 24-31 and column 10, lines 7-9 of Tai).

Regarding claims 62 and 69: Harrington discloses overlapping dots of said threshold array (figure 4B("CY" and "MC") and column 5, lines 46-49 of Harrington).

Regarding claim 64: Harrington discloses using said threshold array to generate a halftone image (column 5, lines 50-56 of Harrington).

Further regarding claim 71: Tai discloses creating a smooth transition between said plurality of dots (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai).

Regarding claim 75: Harrington discloses a program product comprising a program (column 8, lines 35-38 of Harrington) configured to produce a threshold array (figure 3b and column 5, lines 35-39 of Harrington); and a signal bearing medium bearing said program (column 8, lines 35-38 of Harrington).

Harrington does not disclose expressly that said threshold array includes a highlight and a shadow region, wherein the threshold array further includes a smooth transition between said highlight and said shadow region.

Tai discloses a smooth transition (column 9, lines 16-25 of Tai) between highlights and shadows (column 4, lines 30-40 of Tai). A smoothly transitioning dot growth pattern is used in the apparatus of Tai (column 9, lines 16-25 of Tai), which produces a smooth transition between the highlights and shadows (column 4, lines 30-40 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to produce a smooth transition between highlights and shadows, as taught by Tai, in the threshold array taught by Harrington. The motivation for doing so would have been that producing a gradual transition between different image regions will better reproduce images with different regions (column 2, lines 46-51 of Tai) and reduce the overall level of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 75.

Regarding claim 76: Harrington discloses that said signal bearing medium includes a at least one of a recordable medium and a transmission-type medium (column 8, lines 35-38 of Harrington). In order for software to be usable by a computer or workstation, software must be embodied on some form of recordable medium. Otherwise, it is not possible for the computer or workstation to read and execute the instructions in said software. Further, software must be transmittable from some type of physical storage drive to the CPU and RAM of the computer or workstation. Therefore, said signal bearing medium must inherently comprise some form of transmission type medium.

13. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Curry (US Patent 5,696,604).

Regarding claim 10: Harrington does not disclose expressly differing shapes of said first and second dots.

Curry discloses differing dot shapes (column 5, lines 12-17 of Curry).

Harrington and Curry are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Harrington. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Harrington to obtain the invention as specified in claim 10.

14. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Curry (US Patent 5,696,604), Broddin (US Patent 5,982,989), and Kemmochi (US Patent 5,627,919).

Regarding claim 11: Harrington does not disclose expressly selecting said shapes of said first and second dots from a group consisting of: elliptical, cross, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Harrington and Curry are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a

person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Harrington.

Harrington in view of Curry does not disclose expressly that said group also contains elliptical, cross and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Harrington in view of Curry is combinable with Broddin because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Harrington in view of Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Harrington in view of Curry.

Harrington in view of Curry and Broddin does not disclose expressly that said group includes a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Harrington in view of Curry and Broddin is combinable with Kemmochi because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the cross shape, taught by Kemmochi, into the group of halftone dot shapes that can be selected from, as taught by Harrington in view of Curry and Broddin. Said group would then consist of elliptical, cross, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Harrington in view of Curry and Broddin to obtain the invention as specified in claim 11.

15. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Delabastita (US Patent 5,828,463).

Regarding claim 13: Since Harrington teaches using different color dots which are propagated at different angles (figures 4a-4b of Harrington), and it would be reasonable to assume that said first dot and said second dot are oriented at different angles. However, Harrington does not disclose expressly orienting a first angle of said first dot differently than a second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15-20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Harrington and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Harrington at different angles, as taught by Delabastita. The suggestion for doing so would have been that, as is well-known in the art, different color dots are oriented at different angles. Therefore, it would have been obvious to combine Delabastita with Harrington to obtain the invention as specified in claim 13.

16. Claims 15, 20, 22, 25 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463) and Curry (US Patent 5,696,604).

Regarding claim 20: Wang discloses a first and a second dot within a halftone cell of a halftone screen, wherein at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D; column 6, lines 6-9 and lines 21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang).

Wang does not disclose expressly that said halftone screen is specifically formed by a printing plate; and that said first and second dots are dissimilar.

Delabastita discloses using a printing plate to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita).

Wang and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Wang on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Wang.

Wang in view of Delabastita does not disclose expressly that said halftone screen is specifically formed by a printing plate; and that said first and second dots are dissimilar.

Curry discloses dissimilar dot shapes for halftone dots (column 5, lines 12-17 of Curry).

Wang in view of Delabastita is combinable with Curry because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus dissimilar dot shapes, as taught by Curry, for the first and second dots taught by Wang. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang in view of Delabastita to obtain the invention as specified in claim 20.

Regarding claims 15 and 22: Wang in view of Delabastita does not disclose expressly that each of said first and second dots has a different shape.

Curry discloses different dot shapes for halftone dots (column 5, lines 12-17 of Curry).

Wang in view of Delabastita is combinable with Curry because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Wang. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang in view of Delabastita to obtain the invention as specified in claims 15 and 22.

Regarding claim 25: Wang does not disclose expressly orienting a first angle of said first dot differently than a second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15-20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Wang and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Wang at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Wang to obtain the invention as specified in claim 25.

Regarding claim 74: Wang discloses at least one of a threshold array and a halftone screen (figures 3A-3D and column 6, lines 6-9 of Wang). Since the printing plate (figures 1a-1f and column 2, lines 15-20 of Delabastita) prints the overall image, then the threshold array and halftone screen are therefore associated with said printing plate.

17. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463), Curry (US Patent 5,696,604), Broddin (US Patent 5,982,989), and Kemmochi (US Patent 5,627,919).

Regarding claim 16: Wang in view of Delabastita does not disclose expressly that said different shape is selected from a group consisting of: elliptical, triangular, circular, cross, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Wang in view of Delabastita is combinable with Curry because they are from the same field of endeavor, namely

halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang.

Wang in view of Delabastita and Curry does not disclose expressly that said group also contains elliptical, cross and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Wang in view of Delabastita and Curry is combinable with Broddin because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Wang in view of Delabastita and Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Wang in view of Delabastita and Curry.

Wang in view of Delabastita, Curry and Broddin does not disclose expressly that said group includes a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Wang in view of Delabastita, Curry and Broddin is combinable with Kemmochi because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the cross shape, taught by Kemmochi, into the group of halftone dot shapes that can be selected from, as taught by Wang in view of Delabastita, Curry and Broddin. Said group would then consist of elliptical, triangular, rectangular, circular, cross, diamond and linear shapes. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Wang in view of Delabastita, Curry and Broddin to obtain the invention as specified in claim 16.

18. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463) and Tai (US Patent 5,729,632).

Regarding claim 17: Wang in view of Delabastita does not disclose expressly that said first and second dots have different tonal characteristics.

Tai discloses differing tonal characteristics of various dots (figure 2 and column 3, lines 37-43 of Tai).

Wang in view of Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to differ the tonal characteristics of the dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang in view of Delabastita to obtain the invention as specified in claim 17.

Regarding claim 18: Wang in view of Delabastita does not disclose expressly differing line frequencies of said first and second dots.

Tai discloses differing line frequencies of said first and second dots (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Wang in view of Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of differing line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang in view of Delabastita to obtain the invention as specified in claim 18.

19. Claims 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463), Curry (US Patent 5,696,604), and Tai (US Patent 5,729,632).

Regarding claim 21: Wang in view of Delabastita and Curry does not disclose expressly that each of said first and second dots has a different line frequency.

Tai discloses different line frequencies of said first and second dots (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Wang in view of Delabastita and Curry is combinable with Tai because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of differing line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang in view of Delabastita and Curry to obtain the invention as specified in claim 21.

Regarding claim 24: Wang in view of Delabastita and Curry does not disclose expressly that said first and second dots have different tonal characteristics.

Tai discloses differing tonal characteristics of various dots (figure 2 and column 3, lines 37-43 of Tai).

Wang in view of Delabastita and Curry is combinable with Tai because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to differ the tonal characteristics of the dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang in view of Delabastita and Curry to obtain the invention as specified in claim 24.

20. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Delabastita (US Patent 5,828,463), Curry (US Patent 5,696,604), and Broddin (US Patent 5,982,989).

Regarding claim 23: Wang in view of Delabastita does not disclose expressly that said different shape is selected from a group consisting of: elliptical, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Wang in view of Delabastita is combinable with Curry because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising

circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Wang in view of Delabastita.

Wang in view of Delabastita and Curry does not disclose expressly that said group also contains elliptical and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Wang in view of Delabastita and Curry is combinable with Broddin because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Wang in view of Delabastita and Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Wang in view of Delabastita and Curry to obtain the invention as specified in claim 23.

21. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Pellar (US Patent 4,196,451).

Regarding claim 26: Harrington discloses a halftone cell derived from a threshold equation (figures 3a-3b and column 5, lines 36-43 of Harrington). In order to produce a halftone cell with threshold values, some form of threshold equation is inherent.

Harrington does not disclose expressly that a fold function of said threshold equation generates at least one dot within said halftone cell according to $fold(x) = \left|\left|\left|x\right| - 1/3\right| - 1/3\right| - 1/3\right| * 3$.

Pellar discloses a fold function (column 6, lines 17-25 of Pellar) of a threshold equation that generates at least one dot within a halftone cell (column 6, lines 33-63 of Pellar) according to $fold(x) = \left|\left|\left|x\right| - 1/3\right| - 1/3\right| - 1/3\right| * 3$ (figure 5 and column 6, lines 65-68 of Pellar). The particular fold function is variable, depending upon the desired dot shape characteristics and tone reproduction curve (column 6, lines 65-68 and column 8, line 62 to column 9, line 1 of Pellar). By adjusting the ellipticity (column 8, line 62 to column 9, line 1 of Pellar) one can obtain a specific fold function to produce a particular halftone cell (figure 5 of Pellar). The specific fold function $fold(x) = \left|\left|\left|x\right| - 1/3\right| - 1/3\right| - 1/3\right| * 3$ is merely a particular setting of the apparatus taught by Pellar.

Harrington and Pellar are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a particular setting

of the fold function taught by Pellar to obtain a particular overall halftone cell generation and dot growth, similar to the halftone cell shown in figure 5 of Pellar, but particularly using the fold equation $fold(x)=\left|\left|\left|x\right|-1/3\right|-1/3\right|-1/3\right|*3$. The motivation for doing so would have been to obtain particular dot shape characteristics and tone reproduction curve desired by a user for a particular printing project (column 6, lines 65-68 of Pellar). The fold function $fold(x)=\left|\left|\left|x\right|-1/3\right|-1/3\right|-1/3\right|*3$ is merely one of the many possible functions that can be generated. Therefore, it would have been obvious to combine Pellar with Harrington to obtain the invention as specified in claim 26.

22. Claims 33-37, 39-41, 44, 50-52, 54-58 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Delabastita (US Patent 5,828,463) and Tai (US Patent 5,729,632).

Regarding claims 33 and 67: Harrington discloses a method and apparatus for producing a halftone image (column 4, lines 35-39 of Harrington) using a program that executes on a processor (column 8, lines 35-38 of Harrington), comprising creating a halftone screen including dots that overlap (figure 4B("CY" and "MC") and column 5, lines 46-49 of Harrington).

Harrington does not disclose expressly specifically creating a printing plate including dots of different line frequencies.

Delabastita discloses using a printing plate to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita).

Harrington and Delabastita are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Harrington on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Harrington.

Harrington in view of Delabastita does not disclose expressly that said dots are of different line frequencies.

Tai discloses halftoning with dots of different line frequencies (figure 2; figure 3; and column 8, lines 27-33 of Tai).

Harrington in view of Delabastita is combinable with Tai because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of different line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington in view of Delabastita to obtain the invention as specified in claims 33 and 67.

Further regarding claim 34: Tai discloses integrating fine and coarse frequency dots (column 10, lines 2-7 of Tai).

Regarding claims 35 and 40: Harrington discloses overlapping at least a portion of a first dot of a halftone cell of said printing plate with at least a portion of a second dot of said halftone cell (figure 4B("CY" and "MC") and column 5, lines 46-49 of Harrington). As can clearly be seen in figure 4B of Harrington, two locations in the halftone cell have overlapping dots (figure 4B("CY" and "MC") and column 5, lines 38-46 of Harrington), one location overlapping a cyan and a yellow dot (figure 4B("CY") of Harrington) and one location overlapping a magenta and a cyan dot (figure 4B("MC") of Harrington).

Regarding claims 36 and 41: Harrington discloses placing a first and a second dot within a halftone cell (figure 3 and column 5, lines 36-39 of Harrington).

As discussed above in the arguments regarding claims 33 and 67, said halftone cell would be embodied on the printing plate taught by Delabastita.

Harrington in view of Delabastita does not disclose expressly that said first and second halftone dots are dissimilar.

Tai discloses that said first and second halftone dots are dissimilar (figure 3 and column 8, lines 23-31 of Tai).

Harrington in view of Delabastita is combinable with Tai because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dissimilar dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines

36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington in view of Delabastita to obtain the invention as specified in claims 36 and 41.

Regarding claim 37: As discussed in the arguments regarding claims 33 and 67 above, which are incorporated herein, Harrington teaches creating a halftone screen including dots that overlap (figure 4B("CY" and "MC") and column 5, lines 46-49 of Harrington) and Tai teaches that said dots have different frequencies (figure 2; figure 3; and column 8, lines 23-31 of Tai).

Further regarding claims 39 and 52: Tai discloses that said dots, which are generated (column 8, lines 17-20 of Tai), include a frequency selected from a group consisting of at least one of a coarse pitch (column 8, lines 23-27 of Tai), a fine pitch (column 8, lines 26-31 of Tai), and an integrated pitch (blending of grayscale screen "1" and grayscale screen "2") (column 9, lines 61-65 of Tai).

Regarding claim 44: Harrington in view of Delabastita does not disclose expressly that said printing plate further comprises dots having different line frequencies.

Tai discloses dots being used to create a halftone image have different line frequencies (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Harrington in view of Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would use dots having different line frequencies to create a

halftone image, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington in view of Delabastita to obtain the invention as specified in claim 44.

Further regarding claim 50: Tai discloses that said integrating said fine and coarse frequency dots further includes generating a mid-tone dot (figure 2; column 3, lines 50-59 and column 10, lines 2-7 of Tai). For a grayscale level of 12 in the example of blending shown in Tai (column 10, lines 2-7 of Tai), a maximum dot size (figure 2(dot size 7) of Tai and a mid-tone dot size (figure 2(dot size 5) of Tai) would be used to generate the blending portion of screen "1" (column 3, lines 50-59 of Tai).

Further regarding claim 51: Tai discloses transitioning between said dots of different frequencies using a dot that includes a third pitch (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai). For a grayscale level of 12 in the example of blending shown in Tai (column 10, lines 2-7 of Tai), a maximum dot size (figure 2(dot size 7) of Tai and a different frequency mid-tone dot size (figure 2(dot size 5) of Tai) would be used to generate the blending portion of screen "1" (column 3, lines 50-59 of Tai).

Further regarding claim 54: Tai discloses creating a smooth transition between said dots (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai).

Further regarding claim 55: Tai discloses a gradual transition between said dots having different line frequencies (column 9, lines 63-65 and column 10, lines 7-9 of Tai).

Further regarding claims 56 and 57: Tai discloses a dot having a third line frequency (figure 2 and column 3, lines 50-59 of Tai), wherein said dot having said third line frequency is positioned between said dots having different line frequencies (column 10, lines 2-7 of Tai). For a blended screen in the example (column 10, lines 2-7 of Tai), the dot having said third line frequency, which is a mid-tone dot (figure 2 (dot size 5) of Tai), of screen "1" would be positioned between said dots having different line frequencies as part of the halftone screen dot growth technique (column 3, lines 50-59 of Tai).

Regarding claim 58: As discussed above in the arguments regarding claims 33 and 67, which are incorporated herein, Harrington discloses a halftone screen (figure 4B of Harrington). Said halftone screen is associated with said printing plate (column 6, lines 49-57 of Delabastita).

23. Claims 53 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Delabastita (US Patent 5,828,463), Tai (US Patent 5,729,632), and Kemmochi (US Patent 5,627,919).

Regarding claims 53 and 59: Harrington in view of Delabastita and Tai does not disclose expressly generating a cross shape.

Kemmochi discloses generating a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Harrington in view of Delabastita and Tai is combinable with Kemmochi because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to generate the cross dot shape taught by Kemmochi in the printing plate halftone screen taught by Harrington in view of Delabastita and Tai. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Harrington in view of Delabastita and Tai to obtain the invention as specified in claims 53 and 59.

24. Claims 63 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Tai (US Patent 5,729,632) and Curry (US Patent 5,696,604).

Regarding claims 63 and 70: Harrington discloses including within said threshold array a plurality of dots (figure 3 and column 5, lines 36-43 of Harrington) that include at least one dissimilar characteristic selected from a group consisting of tone (column 4, lines 36-40 of Harrington) and orientation (figure 4 and column 5, lines 39-43 of Harrington). As is well known in the art, the different printing colors (cyan, magenta, yellow and black) (column 4, lines 36-40 of Harrington) each have different tone characteristics. Therefore, the dots can have different tone characteristics depending upon color conversion values (column 4, lines 53-57 of Harrington) and the results of under color removal (column 5, lines 16-21 of Harrington). Further, as shown in figures 4a and 4b of

Harrington, and as is well-known to those of ordinary skill in the art, the color separation values (column 5, lines 39-43 of Harrington) are printed with different orientations depending upon the color to be printed (figure 4 of Harrington).

Harrington does not disclose expressly that said group consists not only of tone and orientation, as taught by Harrington, but also of line frequency and shape.

Tai discloses that said plurality of dots can also be dissimilar in line frequency (column 8, lines 24-34 and column 10, lines 7-9 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a plurality of dots having different frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington.

Harrington in view of Tai does not disclose expressly that said group consists not only of tone and orientation, as taught by Harrington, and of line frequency, as taught by Tai, but also of shape.

Curry discloses that said plurality of dots can also be dissimilar in shape (column 5, lines 12-17 of Curry).

Harrington in view of Tai is combinable with Curry because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically

have modifiable and thus differing dot shapes, as taught by Curry, thus making the group of dissimilar characteristics of said plurality of dots consist of line frequency, as taught by Tai, shape, as taught by Curry, and tone and orientation, as taught by Harrington. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55-63 of Curry). Therefore, it would have been obvious to combine Curry with Harrington in view of Delabastita to obtain the invention as specified in claims 63 and 70.

25. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Kemmochi (US Patent 5,627,919).

Regarding claim 66: Wang does not disclose expressly that said overlapping further includes generating a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Wang and Kemmochi are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to generate a cross shape, taught by Kemmochi. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Wang to obtain the invention as specified in claim 66.

26. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Tai (US Patent 5,729,632) and Delabastita (US Patent 5,828,463).

Regarding claim 72: Harrington discloses that said recording medium is one medium selected from a group consisting of a threshold array (figure 3b and column 5, lines 36-39 of Harrington) and a halftone screen (column 5, lines 36-39 and column 3, lines 5-8 of Harrington).

Harrington in view of Tai does not disclose expressly that said group consists not only of a threshold array and a halftone screen, as taught by Harrington, but also of a printing plate.

Delabastita discloses a printing plate as a recording medium (column 6, lines 49-57 of Delabastita).

Harrington in view of Tai is combinable with Delabastita because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a printing plate, as taught by Delabastita. Said group would then consist of a threshold array and a halftone screen, as taught by Harrington, and a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Harrington in view of Tai to obtain the invention as specified in claim 72.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Ng et al., US Patent 5,087,981, 11 February 1992, corrects the threshold values of a halftone screen based on the overlapping of the halftone dots.

b. Takahashi et al., US Patent 5,278,671, 11 January 1994, corrects error diffusion, and thus also threshold values, of a halftone screen based on halftone dot overlap.

c. Mark R. Samworth, US Patent 5,892,588, 06 April 1999, printing plates have halftone screens containing dots of various sizes based on sizing criteria; mixed image types are formed based on the halftone screen and solid color areas.

d. Inoue Yoshiaki, US Patent Application Publication 2002/0051213 A1, Published 02 May 2002, filed 04 December 2000, various attributes of a halftone screen, such as shape and line frequency, can be altered by the user with a slide bar.

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened

statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JAT
21 November 2005

James A. Thompson
Examiner
Art Unit 2624

THOMAS D
LEE
PRIMARY EXAMINER